2.8 Noise

This section examines potential noise and vibration impacts resulting from construction and operation of the proposed project. The information used in this analysis is general in nature and is derived from the most readily available information in applicable resource and planning documents.

2.8.1 Existing Conditions

This section provides the existing ambient noise environment, including the sources of noise, in the County of San Diego (County) in relation to noise-sensitive land uses. Ambient noise data and baseline information reviewed for this section include the *Noise Technical Report for the County of San Diego General Plan Update* (PBS&J 2009), *General Plan Update* (2011a), *County of San Diego General Plan, Noise Element Background Report* (DPLU 2007), and *Guidelines for Determining Significance: Noise* (2009a). The following describes the characteristic of noise within the County.

Ambient Noise Setting

The County of San Diego is characterized as a primarily rural environment with low-density development that contributes significantly to the perceived quality of life and the peace and tranquility that exist within the County (County 2011a). However, higher density communities also exist in the County, including Valle de Oro CPA, Spring Valley CPA, and Sweetwater CPA, which have a louder ambient noise environment. Major sources of noise include transportation and non-transportation related activities. Non-transportation noise sources include industrial processing, mechanical equipment, pump stations, and heating, ventilating, and air conditioning (HVAC) equipment. Some non-transportation sources are not stationary but are typically assessed as point or area sources due to the limited area in which they operate, such as truck deliveries, agricultural field machinery, and mining equipment (County 2011a).

Characteristics of Noise and Vibration

Noise is typically defined as unwanted sound. Sounds are perceived based on their loudness (i.e., volume or sound pressure level) or pitch (i.e., tonal or frequency content). The standard unit of measure for sound pressure levels is the decibel (dB). The standard unit used to describe the tonal or frequency content is the Hertz (Hz). Typical frequency ranges consist of 20 hertz (Hz) to 20,000 Hz for audible noise, 100 Hz to 3,000 Hz for normal speech, 20 to 200 Hz for low frequency, and less than 20 Hz for infrasound. Table 2.8-1 shows the sound pressure level, in decibels, of the corresponding frequency of infrasound and low frequency sound necessary for the sound to be heard by the average person (AWEA 2009). Customarily, the young, non-pathological ear can perceive sounds ranging from 20 Hz to 20,000 Hz. Infrasound, at certain frequencies and at high levels, can be audible to some people.

To account for the pitch of sounds and the corresponding sensitivity of human hearing to them, the raw sound pressure level is adjusted with an A-weighting scheme based on frequency that is stated in units of decibels (dBA). Table 2.8-2 depicts typical A-weighted sound levels for various noise sources. A-weighting is acceptable if there is largely middle and high frequency noise present, but if the noise is unusually high at low frequencies, or contains prominent low frequency tones, the A-weighting may not give a valid measure. Human hearing causes sounds dominated by low-frequency components to seem louder than broadband sounds that have the same A-weighted level. Therefore, other weighting schemes are used. The alternate C-weighting curve is a more accurate representation of human response at very high or very low frequencies than the A-weighting curve (County 2011a). Figure 2.8-1 shows that the A-weighting depresses the levels of the low frequencies, as the ear is less sensitive to these (AWEA 2009). Sound measured using the C-weighted network is designated as dBC.

A given level of noise would be more or less tolerable depending on the sound level, duration of exposure, character of the noise sources, time of day during which the noise is experienced, and activity affected by the noise. For example, noise that occurs at night tends to be more disturbing than that which occurs during the day because sleep has the potential to be disturbed. Additionally, rest at night is a critical requirement in the recovery from exposure to high noise levels during the day. In consideration of these factors, different measures of noise exposure have been developed to quantify the extent of the effects anticipated from these activities. For example, some indices consider the 24-hour noise environment of a location by using a weighted average to estimate its habitability on a long-term basis. Other measures consider portions of the day and evaluate the nearby activities affected by it as well as the noise sources. The most commonly used indices for measuring community noise levels are the Equivalent Energy Level (Leq), and the Community Noise Equivalent Level (CNEL).

The decibel level of a sound decreases (or attenuates) exponentially as the distance from the source of that sound increases. For a single point source such as a piece of mechanical equipment, the sound level normally decreases by about 6 dBA for each doubling of distance from the source. Sound that originates from a linear (or “line”) source, such as a heavily traveled traffic corridor, attenuates by approximately 3 dBA per doubling of distance, provided that the surrounding site conditions lack ground effects or obstacles that either scatter or reflect noise.

Wind Turbine Noise

Wind turbines generate both aerodynamic and mechanical noise. Aerodynamic noise is generated by the blades passing through the air. Mechanical noise can be generated from the turbine’s internal gears. Utility scale turbines are usually insulated to prevent mechanical noise from proliferating outside the nacelle, or tower. Depending on the turbine model and wind speed, the aerodynamic noise may seem like a buzzing, whooshing, pulsing, and even sizzling sound. Noise

from two or more turbines may continue to create an oscillating or thumping "wa-wa" effect (Alberts 2006). The frequency component varies with wind speed, blade pitch, and blade speed (Alberts 2006). The noise the human ear can detect from a wind turbine is dependent on the level of background noise (ambient noise).

Wind turbines generate broadband noise-containing frequency components from 20 to 3,600 Hz. There is no universally accepted scientific method of measuring wind turbine noise. However, due to the low frequency components, the C-weighted scale has been determined by the County as most appropriate to measure the potential for noise impacts. Based on a review of studies prepared by George W. Kamperman, P.E., and Richard R. James, INCE, (Kamperman and James 2008) and Epsilon Associates (Epsilon Associates, Inc. 2009), as well as the methodology of other jurisdictions, the County has developed a low frequency sound level limit. If the sound level has a measured difference of more than 20 dB between wind turbine low frequency sound (dBC) and background sound (dBA), there is potential for low frequency noise impact (Epsilon Associates, Inc. 2009). Instead of creating a maximum threshold, this low frequency sound level limit is utilized to pay respect to existing rural ambient background that exists within most of the County. Some jurisdictions use only the A-weighted scale and do not address C-weighted noise. However, there are potential problems when characterizing low-frequency noise using A-weighting because human hearing causes sounds dominated by low-frequency components to seem louder than broadband sounds that have the same A-weighted level, as described above and depicted in Figure 2.8-1.

Noise Effects

Noise has a significant effect on the quality of life. An individual's reaction to a particular noise depends on many factors, such as the source of the noise, its loudness relative to the background noise level, and the time of day. The reaction to noise can also be highly subjective; the perceived effect of a particular noise can vary widely among individuals in a community. Because of the nature of the human ear, a sound must be about 10 dBA greater than the reference sound to be judged as twice as loud. In general, a 3 dBA change in community noise levels is perceivable, while 1 to 2 dBA changes generally are not perceived. With respect to low frequency noise from wind turbines, if there is a measured difference of more than 20 dB between wind turbine low frequency sound (dBC) and background sound (dBA), there is potential for low frequency noise to be perceived. Although the reaction to noise would vary, it is clear that noise is a significant component of the environment, and excessively noisy conditions can affect an individual's health and well-being. The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on a community can be organized into six broad categories: sleep disturbance, permanent hearing loss, human performance and behavior, social interaction of communication, extra-auditory health effects, and general annoyance.

Concerns have been raised about adverse health effects caused by wind turbine noise. Some claims have been made linking low frequency noise to physiological impacts such as rapid heartbeat, nausea, and blurred vision. Several reviews of currently available scientific data, as mentioned previously, have determined that there is no direct causal relationship between wind turbine low frequency sound and health effects. For example, the *Wind Turbine Sound and Health Effects An Expert Panel Review* by the American Wind Energy Association (AWEA 2010) and *The Potential Health Impact of Wind Turbines from* the Chief Medical Officer of Health (CMOH 2010), are based on literature reviews of scientific and medical databases; they both cite current scientific and peer reviewed literature of wind turbine generated sound and low frequency sound. The cited reports all support the conclusion that there is no relationship between wind turbine sound and adverse health. While some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects.

Noise-Sensitive Land Uses

Noise-sensitive land uses include areas where an excessive amount of noise would interfere with normal activities. Primary noise-sensitive land uses include residential uses, public and private educational facilities, hospitals, convalescent homes, hotels/motels, daycare facilities, and passive recreational parks. Sleep disturbance is the most critical concern for a noise-sensitive land use on a 24-hour basis or longer compared to activities that are occupied only a portion of a day.

Groundborne Vibration

Groundborne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be composed of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in Hz. The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz. Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. Ambient and source vibration are often expressed in terms of the peak particle velocity (PPV) or root mean square (RMS) velocity in inches per second that correlates best with human perception. The Federal Transit Administration (FTA) estimates that the threshold of perception is approximately 0.0001 inches/second RMS and the level at which continuous vibrations begins to annoy people is approximately 0.001 inches/second RMS (FTA 2006).

Vibration Sensitive Land Uses

Groundborne vibration can disrupt vibration-sensitive land uses by causing movement of buildings, rattling of windows and items inside buildings, rumbling sounds, and even property damage. Vibration-sensitive land uses include buildings where vibration would interfere with operations within the building, such as vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations. The degree of sensitivity to vibration depends on the specific equipment that would be affected by the vibration. Residential uses are also sensitive to excessive levels of vibration of either a regular or an intermittent nature. According to the Transit Noise and Vibration Impact Assessment (FTA 2006), background vibration level in residential areas is typically 0.00003 inches/second RMS, which is lower than 0.0001 inches/second RMS, the threshold of perception for humans. There are several sources of groundborne vibration in the unincorporated County, including construction, railroad operations, and extractive mining operations (see Table 2.8-3).

Ambient Noise Setting

The County is characterized as a primarily rural environment with low-density development that contributes significantly to the perceived quality of life and the peace and tranquility that exist within the County. However, several higher-density communities, including Valle de Oro community planning area (CPA), Spring Valley CPA, and Sweetwater CPA, also exist, which have a louder ambient noise environment.

Non-transportation-related noise generators are commonly called “stationary,” “fixed,” “area,” or “point” sources of noise. Industrial processing, mechanical equipment, pump stations, and heating, ventilating, and air conditioning (HVAC) equipment are examples of fixed location, non-transportation noise sources within the County. Some non-transportation sources are not stationary but are typically assessed as point or area sources due to the limited area in which they operate, such as truck deliveries, agricultural field machinery, and mining equipment.

Temporary and/or Nuisance Noise

Temporary construction activities are disturbing to residents but are difficult to attenuate and control. Noise complaints occur more frequently in densely developed areas of the unincorporated County, such as the Spring Valley CPA and Valle de Oro CPA, as well as areas that are heavily agricultural, such as Fallbrook CPA and Valley Center CPA.

Community Noise Survey

During February and March 2008, PBS&J conducted noise measurements with the purpose of establishing baseline for transportation and non-transportation noise generators throughout the

County. Locations were monitored using a Larson-Davis American National Standards Institute (ANSI) Type II integrating sound level meter to establish existing ambient noise levels. Noise meter locations varied for each measurement according to site accessibility. A total of 44 short-term (15-minute) measurements were conducted to provide a basis for understanding the overall existing noise environment of the County. A 15-minute sample is considered a "snapshot" of the baseline noise environment at a given time; however, the sound level would vary depending on time, day, or season.

The results of the community noise survey show that the locations with the highest noise levels (between 70 dBA and 74 dBA Leq) were roadways (including Interstate (I) 8, boulevards, and a prime arterial), a Sprinter pass-by area in North County Metro Subregion, a shooting range in Valle de Oro CPA, Ramona Landfill, and construction in Spring Valley CPA. The locations with the lowest noise levels (between 43 dBA and 50 dBA) were a resort in Borrego Springs, residential developments in San Dieguito CPA and Lakeside CPA, and noise-sensitive biological resources in Lakeside CPA, all of which were subject to limited traffic noise. Other land use designations in this range were a recreational park in Julian CPA, a school in Pala/Pauma Valley Subregion with school bells and children at recess, and agricultural use in Pala/Pauma Valley Subregion using tractors and forklifts.

Noise Contours

Noise level contours are used as a guide for minimizing the exposure of community residents to noise. Noise contours represent lines of equal noise exposure. Contours are used to provide a general visualization of sound levels and should not be considered as absolute lines of demarcation. Noise contours for roadway noise sources in the County were developed for existing conditions (2007) and the General Plan Update conditions (2030) and are expressed as CNEL values.

2.8.2 Regulatory Setting

Federal Regulations

Federal Aviation Administration (FAA) Standards

Enforced by the FAA, Title 14, Part 150 of the Code of Federal Regulations prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving or disapproving those programs. Title 14 also identifies land uses that are normally compatible with various levels of exposure to noise by individuals. It provides technical assistance to airport operators, in conjunction with other local, state, and federal authorities, to

prepare and execute appropriate noise compatibility planning and implementation programs. The FAA establishes a CNEL of 65 dBA as the noise standard associated with aircraft noise.

U.S. Environmental Protection Agency (EPA)

The EPA has indicated that residential noise exposure of 55 to 65 dBA is acceptable when analyzing land use compatibility (EPA 1981); however, these guidelines are not regulatory. With regard to noise exposure and workers, the federal Occupational Safety and Health Administration (OSHA) establishes regulations to safeguard the hearing of workers exposed to occupational noise (29 CFR 1910.95). OSHA specifies that sustained noise over 85 dBA (8-hour time-weighted average) can be a threat to workers' hearing, and if worker exposure exceeds this amount, the employer shall develop and implement a monitoring plan (29 CFR 1910.95(d)(1)).

U.S. Office of Surface Mining Reclamation and Enforcement

The U.S. Office of Surface Mining Reclamation and Enforcement (OSM) has established guidelines related to blasting for surface mining activities. The OSM guidelines requires the operator to distribute a blasting schedule, post blasting signs, and control access within the blasting area. OSM has established air blast and ground vibration limits at the location of any dwelling, public building, school, church, or community building outside the permit area. The standard PPV damage threshold for residential structures is 2.0 inches per second. This requirement is based on the findings and recommendations of several reports made by the former U.S. Bureau of Mines.

State Regulations

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, finds that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also finds that there is a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

California Airport Noise Standards (21 CCR 5000 et seq.)

The 1990 California Airport Noise Standards are designed to cause the airport proprietor, aircraft operator, local governments, pilots, and the California Department of Transportation's Division of

Aeronautics to work cooperatively to diminish noise. The regulations accomplish these ends by controlling and reducing noise in the communities in the vicinity of airports. The level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dBA. The limitations on airport noise in residential communities are established as follows:

a. The criterion CNEL is 65 dBA for proposed new airports and for active military airports being converted to civilian use.

b. The criterion CNEL for existing civilian airports is 65 dBA.

California Airport Land Use Planning Handbook

The California Airport Land Use Planning Handbook provides guidance for the assessment of noise compatibility of land uses near airports. Guidance is based on existing federal and state regulations and policies. The handbook states that 65 dBA is the basic limit of acceptable noise exposure for residential and other noise-sensitive land uses and recommends an annual CNEL standard of 60 dBA to be used for new residential development; however, this standard has been set with respect to relatively noisy urban areas and may be too high of a noise level to be appropriate as a standard for land use compatibility planning. The level of noise deemed acceptable in one community is not necessarily the same in another. A noise level above 60 dBA CNEL may be considered incompatible with some residential uses. According to the handbook, noise compatibility standards typically place primary emphasis on residential areas because residential development is one of the most noise-sensitive land uses and usually covers the greatest proportion of urban land. Three CNELs are commonly used as the limit for acceptable residential noise exposure: CNEL 65, 60, or 55 dBA. The handbook also includes normalization factors as a method for adjusting aircraft noise levels used for determining and predicting community reactions. Because the acceptable residential noise level standard may vary between communities, noise compatibility issues are addressed in the Airport Land Use Compatibility Plans (ALUCPs) prepared for individual airports.

All land-use jurisdictions in the County have ordinances that regulate activities in order to reduce noise impacts. As stated previously, any noise generated by the construction, operation, and maintenance of projects under the proposed Zoning Ordinance amendment would be required to comply with the standards and regulations governing noise limits within the applicable jurisdiction.

Local Regulations

Airport Land Use Compatibility Plans (ALUCPs)

ALUCPs are plans that guide property owners and local jurisdictions in determining what types of proposed new land uses are appropriate around airports. They are intended to protect the

safety of people, property, and aircraft on the ground and in the air in the vicinity of an airport. ALUCPs are based on a defined area around an airport known as the Airport Influence Area. ALUCPs include policies that address noise compatibility issues associated with airports and their respective Airport Influence Areas.

County of San Diego General Plan Update, Noise Element

The General Plan Update Noise Element establishes noise and land use compatibility standards and outlines goals and policies to achieve these standards. The County's General Plan Noise Element characterizes the noise environment in the County and provides the context for the County's noise/land use compatibility guidelines and standards. The Noise Element also describes the County's goals for achieving the standards and introduces policies designed to implement the goals. Under implementation of the General Plan Update, the County would use the Noise Compatibility Guidelines to determine the compatibility of land uses when evaluating proposed development projects. The Noise Compatibility Guidelines indicate ranges of compatibility and are intended to be flexible enough to apply to a range of projects and environments.

A land use located in an area identified as "acceptable" indicates that standard construction methods would attenuate exterior noise to an acceptable indoor noise level and that people can carry out outdoor activities with minimal noise interference. Land uses that fall into the "conditionally acceptable" noise environment should have an acoustical study that considers the type of noise source, the sensitivity of the noise receptor, and the degree to which the noise source has the potential to interfere with sleep, speech, or other activities characteristic of the land use. For land uses indicated as "conditionally acceptable," structures must be able to attenuate the exterior noise to the indoor noise level as indicated in the Noise Standards. For land uses where the exterior noise levels fall within the "unacceptable" range, new construction generally should not be undertaken.

San Diego County Code of Regulatory Ordinances Title 3, Division 6, Chapter 4, Sections 36.401–36.435, Noise Ordinance

The Noise Ordinance establishes prohibitions for disturbing, excessive, or offensive noise as well as provisions such as sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet for its citizens. Planned compliance with sound level limits and other specific parts of the ordinance allows presumption that the noise is not disturbing, excessive, or offensive. Limits are specified depending on the zoning placed on a property (e.g., varying densities and intensities of residential, industrial, and commercial zones). Where two adjacent properties have different zones, the sound level limit at a location on a boundary between two properties is the arithmetic mean of the respective limits for the two zones, except for extractive industries. The 1-hour average sound level limit applicable to extractive industries,

including but not limited to borrow pits and mines, shall be 75 dBA at the property line regardless of the zone in which the extractive industry is located. It is unlawful for any person to cause or allow the creation of any noise that exceeds the applicable limits of the Noise Ordinance at any point on or beyond the boundaries of the property on which the sound is produced.

Section 36.404 of the County Noise Ordinance contains sound level limits specific to receiving land uses. Sound level limits are in terms of a 1-hour average sound level The allowable noise limits depend upon the County's zoning district and time of day. The proposed project would be located in any zone within the County. Tables 2.8-4 and 2.8-5 list the sound level limits for the County. Section 36.408 of the County Noise Ordinance sets limits on the time of day and days of the week that construction can occur, as well as setting noise limits for construction activities. In summary, the ordinance prohibits operating construction equipment on the following days and times:

- Mondays through Saturdays except between the hours of 7:00 a.m. and 7:00 p.m.
- Sundays and days appointed by the president, governor, or board of supervisors for a public fast, Thanksgiving, or other holiday.

In addition, the code requires that between the hours of 7:00 a.m. and 7:00 p.m., no equipment shall be operated so as to cause an 8-hour average construction noise level in excess of 75 dBA when measured at the boundary line of the property where the noise source is located, or on any occupied property where the noise is being received.

Octave Band Sound Level Limits

Except as provided in Sections 36.404, 36.409, 36.410 of the Noise Abatement and Control Ordinance, it shall be unlawful for any person to cause or allow the creation of any wind turbine as defined in Section 6158 of the Zoning Ordinance, which exceeds the allowable octave band sound level limits in Table 2.8-6, when these sound levels are measured at the property line or at any place on the affected property.

The limits in Table 2.8-6 subsection (1) apply to all zones with an allowed residential use (RS, RD, RR, RMH, RRO, RC, RM, A70, A72, S81, S86, S87, S90, S92, RV, RU, and all Village Zones (V1-5)). The limits in Table 2.8-6 subsection (2) apply to property zoned with a commercial, agricultural, or civic use (S80, S94, and all listed commercial zones). The limits in Table 2.8-6 subsection (3) apply to property zoned with an industrial use (M50, M52, M54, M56, M58). S88 zones are Specific Planning Areas, which allow different uses. The sound level limits in Table 2.8-6 that apply in an S88 zone depend on the use being made of the property. The limits in Table 2.8-6 subsection (1) apply to any property with an allowed residential use. The limits in Table 2.8-6 subsection (2) apply to property with a commercial, agricultural, or civic

use. The limits in Table 2.8-6 subsection (3) apply to property with an industrial use that would only be allowed in an M50, M52, M54, M56, or M58 zone. The limits in Table 2.8-6 subsection (3) apply to all property identified as public lands with no residential uses within a half-mile radius of the turbine sites. Those residential uses within the half-mile radius shall apply limits in subsection (1).

2.8.3 Analysis of Project Effects and Determination of Significance

The proposed project consists of amendments to the Zoning Ordinance related to wind turbines and temporary Meteorological Testing (MET) facilities. Under the proposed project, large turbines will continue to require approval of a Major Use Permit, while a small wind turbine or MET facility meeting the height designator of the zone in which it is located would be allowed without discretionary review. The following impact analysis has been separated into "Small Turbine(s)/MET Facilities" and "Large Turbine(s)" to reflect the distinction in the level of review required for the establishment of each use (discretionary vs. non-discretionary).

2.8.3.1 Excessive Noise Levels

Guidelines for the Determination of Significance

The County's *Guidelines for Determining Significance: Noise* (2009a) is consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines and is intended to provide consistency in the environmental process. The guidelines of significance apply to direct and indirect impact analysis, as well as the cumulative impact analysis.

A significant impact would result if:

- The project would result in the exposure of persons to or generation of noise levels in excess of standards established by the County's General Plan, County's Noise Ordinance, County's Noise Compatibility Guidelines, or County's Zoning Ordinance.

Analysis

The proposed Zoning Ordinance amendment applies to the entire unincorporated County with regard to small turbines and MET facilities, and to a significant portion of the unincorporated County with regard to large turbines (see Section 1.4, Project Description); therefore, it includes sites that may be impacted with potential increase in noise levels within the vicinity of a future wind turbine and MET facility. Noise levels are regulated by the County General Plan Noise Element, Noise Ordinance and Wind Turbine Ordinance. The Noise Element designates permissible noise levels (dBA) for various land-use zones and regulates vehicle noise levels associated with development. The Noise Ordinance also regulates noise levels associated with

on-site operation and construction, and includes permissible noise levels. The proposed Zoning Ordinance amendment includes the following noise provisions relative to large wind turbines as a part of the County's Wind Turbine Ordinance:

The applicant shall prepare and submit an acoustical study. The study shall be conducted by a County-approved acoustical consultant and shall demonstrate that each large wind turbine complies with all applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq., and also meets the follow low frequency sound limit:

1. The C-weighted sound level from each large wind turbine while operating shall not exceed the long-term background sound level by more than 20 decibels as both sound levels are measured at each property line of the lot on which the large turbine is located.

2. Noise Waiver. An increase in the C-weighted sound level limit specified in section 6259f1 for one or more turbines may be approved in accordance with the following:

   a) The large wind turbine complies with all other applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq.; and

   b) The higher C-weighted sound limit is acceptable due to specific economic, social, technological or other benefits that will result from approval of the Major Use Permit and implementation of the Proposed Project.

3. Post-construction Sound Measurements. Within 12 months after the date that each large turbine begins to operate, the recipient of the Major Use Permit (Permittee) shall perform a post-construction sound study to determine if each large turbine is operating in compliance with all applicable noise regulations. The post-construction sound study shall be conducted by a County-approved acoustical consultant chosen by the Department of Planning and Land Use. The Permittee shall enter into a secured agreement with the County to ensure that the study will be performed. The form and content of the agreement and the security shall be subject to the approval of the Director of Planning and Land Use. The Permittee's consultant may observe the County's consultant while he/she performs the sound study. The Permittee shall provide all technical information requested by the Department of Planning and Land Use or the County's acoustical consultant to complete the study. After completion of the first post-construction sound study, an additional study shall be performed at least once every five years until the large wind turbine permanently ceases to operate.

Small Turbine(s)/MET Facilities

The proposed project would allow small wind turbines or MET facilities without discretionary review if they meet the zoning verification requirements in the amended ordinance. Small turbine or MET facility projects that do not meet these criteria would continue to require discretionary review through the Administrative Permit process. These projects would be evaluated as part of the County's discretionary environmental review process (CEQA) and would be required to implement measures to minimize impacts to noise, as necessary. The following analyzes potential noise impacts associated with ministerial small wind turbines and MET facilities.

Construction

Construction activities associated with small wind turbines could range from a small footprint on top of an existing building (up to five roof-mounted turbines) to facilities on the ground (up to three turbines) near an existing building. Temporary MET facilities would also be developed on a relatively small footprint. It is not anticipated that blasting would be required to support the construction of any small wind turbines or MET facilities. Construction activities would be temporary and would not include equipment associated with the generation of excessive noise. Additionally, Section 36.408 of the County's Noise Ordinance sets limits on hours of operation for construction equipment, and Section 36.409 of the County's Noise Ordinance sets sound level limits on construction equipment. In summary, the ordinance prohibits operating construction equipment on the following days and times:

- Mondays through Saturdays except between the hours of 7:00 a.m. and 7:00 p.m.
- Sundays or a holiday (January 1st, last Monday in May, July 4th, the first Monday in September, December 25th, and any day appointed by the president as a special national holiday or the governor of the state as a special state holiday. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10:00 a.m. and 5:00 p.m. at the person's residence provided compliance with Section 36.409 and 36.410 of the County's Noise Ordinance.

The code also requires that between the hours of 7:00 a.m. and 7:00 p.m. no equipment shall be operated so as to cause an 8-hour average construction noise level in excess of 75 dBA when measured at the boundary line of the property where the noise source is located, or on any occupied property where the noise is being received. As a result, construction noise for small wind turbines or MET facilities would be below the CNEL exterior location threshold. Construction impacts associated with small wind turbines and MET facilities would result in **less-than-significant** noise levels.

Operational

As described in Section 2.8.1, operational noise from a wind turbine would consist of aerodynamic noise and mechanical noise. Mechanical noise is in relation to the motion of mechanical and electrical equipment. On modern residential-scale wind turbines, there are only two to four moving parts, so the mechanical noise from these small turbines is minimal; most of the noise emitted by these small-scale facilities is from the high rotational speed of the blades that induces aerodynamic noise (Sacora 2004).

Modern turbines have been redesigned to include noise reduction technologies such as providing upwind rotors; towers and nacelles have been rounded or given aerodynamic shape, soundproofing the nacelles has been increased, and the blades have become more efficient (the more efficient the blades, the more wind energy is converted into rotational energy and the less aerodynamic noise is generated) (Sacora 2004).

The largest noise producing element of a small wind turbine is the self-breaking mechanism such as side furling, upward furling; angle governor and blade-feathering governor are used to slow down high speed blade rotation in high winds. When this occurs a large amount of aerodynamic noise is emitted. The noise can be similar to the sound of a helicopter or a small plane taking off, but it only lasts for short bursts of time until the wind gust dies down (Sacora 2004). As part of the zoning verification permit process under the proposed Zoning Ordinance amendment, all future small wind turbines would be required to submit information regarding the potential noise levels of the proposed wind turbine at the proposed location and at the nearest property lines to demonstrate compliance with the County's Noise Compatibility Guidelines and Noise Ordinance.

Maintenance of small wind turbines can be conducted by the owner of the facility or by a technician. Maintenance activities may include vegetation clearance as needed and a maintenance inspection that would take place as needed—typically annually. These activities would not result in a large number of vehicle trips to the future project sites or generate substantial noise. Therefore, noise impacts from maintenance activities would be less than significant.

Most small residential wind turbines are direct-drive devices with few moving parts, and they do not begin turning until a certain cut-in speed is reached. Therefore, on calm, windless days there is no noise generated by most small wind turbines. These turbines vary in speed, turning faster and thus creating more sound as wind speed increases. However, ambient background noise also increases with wind speed, thereby masking most of a small wind turbine's aerodynamic sound. While this sound may be distinguishable from ambient noise, even though it is not louder, the same can be said for all other components of ambient noise (e.g., kids playing, dogs barking, traffic, trees swaying, etc.) (Colby et al. 2009).

The proposed Zoning Ordinance amendment would require setbacks that meet the height and setback requirements of the land-use zone. If a proposed wind turbine tower exceeds the height limit of the zone, the setback requirements would result in a setback from all property lines, open space easements, private road easements, and public roads by a distance equal to the wind turbine height or the applicable setback requirements of the zone, whichever is greater. No portion of the proposed facility would be allowed closer than 30 feet to any property lines, and if constructed at grade, the facility would not be permitted to be located within 10 feet of any given structure. The ordinance would require, as part of the zoning verification permit process, that the applicant submit information with regard to the noise levels of the proposed small wind turbine or MET facility at the proposed location and at the nearest property lines to demonstrate compliance with the County's Noise Compatibility Guidelines and Noise Ordinance. The implementation of the minimum setbacks and the requirement for noise data under the Zoning Ordinance amendment would ensure that interior and exterior noise levels from the implementation of small wind turbines and MET facilities be **less than significant**.

Large Turbine(s)

The proposed project amends certain provisions of the County's Zoning Ordinance related to large wind turbines. These updates are necessary to address advancements in technology that have obviated many of the current provisions. The proposed amendment related to large wind turbines consist of updated definitions and requirements related to setbacks, noise, height, and locations where large turbines are permissible. The updated requirements for large wind turbines relative to noise are previously described in this section.

Additionally, all future large turbine projects would be subject to discretionary review and required to obtain a Major Use Permit. As part of the County's discretionary review process, all future projects would be evaluated under CEQA and would be required to implement measures to minimize impacts to excessive noise levels. CEQA requires proposed projects to provide detailed information on the potentially significant environmental effects they are likely to have, list ways in which the significant environmental effects would be minimized, and identify alternatives that would reduce or avoid the significant impacts.

Future development of large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element noise standards, and Noise Ordinance. Compliance with these regulations would be ensured through the preparation of an acoustical study, as well as a post-construction acoustical study. The regulations establish A-weighted sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet.

Although future large wind turbine projects are also required to meet the low frequency (C-weighted) sound limit established in the Wind Energy Ordinance, it is possible for a noise waiver to be granted subject to specific conditions. These projects must still be compliant with all A-weighted requirements, but a higher C-weighted sound limit may be approved. As stated in Section 2.8.1, the local environment and topographic conditions could cause a difference in the noise perceived from wind turbines and therefore a higher C-weighted sound level may not result in an impact. However, in some cases a higher C-weighted sound level may potentially create an annoyance. Concerns are occasionally raised about adverse health effects caused by wind turbine low frequency noise, but there is currently no published scientific evidence to conclude wind turbine noise could cause health effects. Therefore, the proposed project may result in significant impacts related to annoyance from low-frequency noise from large wind turbines **(NOI-1).**

2.8.3.2 Excessive Groundborne Vibration

Guidelines for Determination of Significance

The County's *Guidelines for Determining Significance: Noise* (2009a) is consistent with Appendix G of the CEQA Guidelines and is intended to provide consistency in the environmental process. The guidelines of significance apply to direct and indirect impact analysis, as well as the cumulative impact analysis.

A significant impact would result if:

- The project would result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Analysis

Potential sources of groundborne vibration include construction, railroads, and extractive mining operations. The proposed Zoning Ordinance amendment applies to the entire unincorporated County with regard to small turbines and MET facilities, and to a significant portion of the unincorporated County with regard to large turbines (see Section 1.4, Project Description); therefore, it includes sites that may be impacted with potential excessive groundborne vibration or groundborne noise levels.

Small Turbine(s)/MET Facilities

The construction of future small wind turbines and MET facilities could generate groundborne vibration or groundborne noise. The levels of vibration generated during construction activities would depend on a number of factors, including the amount of vibration-generating activity (grading/excavation) required for the project and the nearest vibration-sensitive receptor.

Construction activities associated with small wind turbines could range from a small footprint on top of an existing building (up to five roof-mounted turbines) to facilities on the ground near an existing building (up to three turbines). Temporary MET facilities would also be developed on a relatively small footprint. It is not anticipated that blasting would be required to support the construction of any small wind turbine or MET facilities. Future grading operations could occur in the vicinity of sensitive land uses (as identified in Table 2.8-7), resulting in groundborne vibration. Vibration is subjective, and could become a nuisance to the public at continuous vibration levels near the level of perception (or at approximately a peak particle velocity of .01 inch/second). Future small wind turbines and MET facilities are not expected to require blasting or major grading activities and, therefore, are not expected to require the operation of heavy earth-moving equipment. Additionally, all future projects would be required to comply with the Section 36.409 and 36.410 of the County's Noise Ordinance. Therefore, potential impacts would be **less than significant**.

Large Turbine(s)

The proposed project amends certain provisions of the County's Zoning Ordinance related to large wind turbines. These updates are necessary to address advancements in technology that have obviated many of the current provisions. The proposed amendment related to large wind turbines consist of updated definitions and requirements related to setbacks, noise, height, and locations where large turbines are permissible. Updated noise requirements are provided in Section 2.8.3.1.

In addition to the updated noise requirements, all future large turbine projects would be subject to discretionary review and required to obtain a Major Use Permit. As part of the County's discretionary review process, all future projects would be evaluated under CEQA and would be required to implement measures to minimize impacts to groundborne vibration and groundborne noise levels. As part of the CEQA process, the County would require projects with the potential to result in vibration impacts to conduct a Noise Impact Analysis report to determine if impacts would be significant. CEQA requires proposed projects to provide detailed information on the potentially significant environmental effects they are likely to have, list ways in which the significant environmental effects would be minimized, and identify alternatives that would reduce or avoid the significant impacts identified for the proposed project. As part of the County's discretionary review process, all future projects would be evaluated under CEQA and required to implement the maximum feasible mitigation measures. Future development of large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element Noise Standards, Noise Ordinance, and Wind Energy Ordinance. The Noise Element and Noise Ordinance establish groundborne vibration limits that must be adhered to for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet. Therefore, impacts would be **less than significant**.

2.8.3.3 Permanent Increase in Ambient Noise Levels

Guidelines for Determination of Significance

The County's *Guidelines for Determining Significance: Noise* (2009a) is consistent with Appendix G of the CEQA Guidelines and is intended to provide consistency in the environmental process. The guidelines of significance apply to direct and indirect impact analysis, as well as the cumulative impact analysis.

A significant impact would result if:

- The project would cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the proposed project.

Analysis

The proposed Zoning Ordinance amendment applies to the entire unincorporated County with regard to small turbines and MET facilities, and to a significant portion of the unincorporated County with regard to large turbines (see Section 1.4, Project Description). The future development of wind turbines and MET facilities would have the potential to substantially increase ambient noise levels above existing conditions.

Small Turbine(s)/MET Facilities

The proposed project would allow small wind turbines or MET facilities without discretionary review if they meet the zoning verification requirements in the amended ordinance. Small turbine or MET facility projects that do not meet these criteria would continue to require discretionary review through the Administrative Permit process. These projects would be evaluated as part of the County's discretionary environmental review process (CEQA) and would be required to implement measures to minimize impacts to noise, as necessary. The following analyzes potential noise impacts associated with small wind turbines and MET facilities.

Vehicle Traffic Noise

As discussed in Section 2.9, Transportation and Traffic, operational traffic would consist of sporadic maintenance trips as the need arises—typically annually. Maintenance efforts would likely consist of one vehicle and a small amount of equipment accessing the project site. Large construction equipment (i.e., bulldozers) would not be utilized during the operational phase of future projects. Due to the small number of vehicles and equipment likely to be required for maintenance at future project sites, increases in ambient noise levels due to operational traffic would be less than significant.

On-Site Generated Noise

As discussed in Section 2.8.3.1, the operational phase of a wind turbine may result in a combination of aerodynamic and mechanical noise emitted by the turbines themselves. The ordinance would require, as part of the zoning verification permit process, that the applicant submit information with regard to the noise levels of the proposed wind turbine at the proposed location and at the nearest property lines. The implementation of the minimum setbacks and the requirement for noise data under the Zoning Ordinance amendment would ensure that interior and exterior noise levels from the implementation of small wind turbines and MET facilities comply with the Noise Ordinance and would therefore be **less than significant.**

Large Turbine(s)

The proposed project amends certain provisions of the County's Zoning Ordinance related to large wind turbines. These updates are necessary to address advancements in technology that have obviated many of the current provisions. The proposed amendment related to large wind turbines consist of updated definitions and requirements related to setbacks, noise, height, and locations where large turbines are permissible. Updated noise requirements are provided in Section 2.8.3.1.

In addition to the updated noise requirements, all future large turbine projects would be subject to discretionary review and required to obtain a Major Use Permit. As part of the County's discretionary review process, all future projects would be evaluated under CEQA and would be required to implement measures to minimize impacts to ambient noise. CEQA requires proposed projects to provide detailed information on the potentially significant environmental effects they are likely to have, list ways in which the significant environmental effects would be minimized, and identify alternatives that would reduce or avoid the significant impacts identified for the proposed project. As part of the County's discretionary review process, all future projects would be evaluated under CEQA and required to implement the maximum feasible mitigation measures. Future development of large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element Noise Standards, and Noise Ordinance. Compliance with these regulations would be ensured through the preparation of an acoustical study, as well as a post-construction acoustical study. The regulations establish A-weighted sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet.

Although future large wind turbine projects are also required to meet the low frequency (C-weighted) sound limit established in the Wind Energy Ordinance, it is possible for a noise waiver to be granted subject to specific conditions. These projects must still be compliant with all A-weighted requirements, but a higher C-weighted sound limit may be approved. As stated in

Section 2.8.1, the local environment and topographic conditions could cause a difference in the noise perceived from wind turbines and therefore a higher C-weighted sound level may not result in an impact. However, in some cases a higher C-weighted sound level may potentially create an annoyance. Concerns are occasionally raised about adverse health effects caused by wind turbine low frequency noise, but there is currently no published scientific evidence to conclude wind turbine noise could cause health effects. Therefore, the proposed project may result in significant impacts related to low-frequency noise from large wind turbines, which may affect existing ambient noise levels **(NOI-2).**

2.8.3.4 Temporary or Periodic Increase in Ambient Noise Levels

Guidelines for Determination of Significance

The County's *Guidelines for Determining Significance: Noise* (2009a) is consistent with Appendix G of the CEQA Guidelines and is intended to provide consistency in the environmental process. The guidelines of significance apply to direct and indirect impact analysis, as well as the cumulative impact analysis. A significant impact would result if:

- The project would cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the proposed project.

Analysis

Construction activities including, but not limited to, site grading, truck/construction equipment movement, engine noise, rock excavation, rock crushing, and blasting would have the potential to result in the exposure of on- or off-site areas to noise in excess of the standards listed in the County Code Sections 36.408 and 36.409. Typical construction equipment noise levels are provided in Table 2.8-8.

Small Turbine(s)/MET Facilities

As discussed in Section 2.9 of this EIR, construction activities would generate a small amount of temporary traffic on project area roadways. Construction traffic would consist of equipment delivery and additional vehicles if the property owner is unable to install the turbines themselves. Some smaller facilities, such as a roof-mounted turbine, would not require construction vehicles at the project site since these facilities can typically be installed by the property owner. Only facilities requiring substantial earth-moving activities or those requiring the delivery of larger-scale turbine tower or hub equipment would require heavy, drivable equipment. Due to the brief construction time period associated with the installation of residential-scale wind turbines and because traffic generated by the construction of small wind turbines would be relatively minor, temporary and periodic noise impacts would be **less than significant**.

Large Turbine(s)

The proposed project amends certain provisions of the County's Zoning Ordinance related to large wind turbines. These updates are necessary to address advancements in technology that have obviated many of the current provisions. The proposed amendment related to large wind turbines consist of updated definitions and requirements related to setbacks, noise, height, and locations where large turbines are permissible. Updated noise requirements are provided in Section 2.8.3.1.

In addition to the updated noise requirements, all future large turbine projects would be subject to discretionary review and required to obtain a Major Use Permit. As part of the County's discretionary review process, all future projects would be evaluated under CEQA and would be required to implement measures to minimize impacts to ambient noise. CEQA requires proposed projects to provide detailed information on the potentially significant environmental effects they are likely to have, list ways in which the significant environmental effects would be minimized, and identify alternatives that would reduce or avoid the significant impacts identified for the proposed project. As part of the County's discretionary review process, all future projects would be evaluated under CEQA and required to implement the maximum feasible mitigation measures. Future development of large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element Noise Standards, and Noise Ordinance,. Compliance with these regulations would be ensured through the preparation of an acoustical study, as well as a post-construction acoustical study. The regulations establish A-weighted sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet.

Although future large wind turbine projects are also required to meet the low frequency (C-weighted) sound limit established in the Wind Energy Ordinance, it is possible for a noise waiver to be granted subject to specific conditions. These projects must still be compliant with all A-weighted requirements, but a higher C-weighted sound limit may be approved. As stated in Section 2.8.1, the local environment and topographic conditions could cause a difference in the noise perceived from wind turbines and therefore a higher C-weighted sound level may not result in an impact. However, in some cases a higher C-weighted sound level may potentially create an annoyance. Concerns are occasionally raised about adverse health effects caused by wind turbine low frequency noise, but there is currently no published scientific evidence to conclude wind turbine noise could cause health effects. Therefore, the proposed project may result in significant impacts related to low-frequency noise from large wind turbines, which results in a temporary or periodic increase in ambient noise **(NOI-3).**

2.8.3.5 Excessive Noise Exposure from a Public or Private Airport

Guidelines for Determination of Significance

The County's *Guidelines for Determining Significance: Noise* (2009a) is consistent with Appendix G of the CEQA Guidelines and is intended to provide consistency in the environmental process. The guidelines of significance apply to direct and indirect impact analysis, as well as the cumulative impact analysis.

A significant impact would result if:

- The project is located within an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, that would expose people residing or working in the project area to excessive noise levels.
- The project is located within the vicinity of a private airstrip that would expose people residing or working in the project area to excessive noise levels.

Analysis

The proposed project would have a significant impact if it would expose people residing or working in the project area to excessive noise levels from a public airport or private airstrip. Six public airports are located in the unincorporated County. These include Agua Caliente Airstrip (Desert Subregion), Borrego Valley Airport (Desert Subregion), Fallbrook Community Airpark (Fallbrook CPA), Jacumba Airport (Mountain Empire Subregion), Ocotillo Airstrip (Desert Subregion), and Ramona Airport (Ramona CPA). Gillespie Field is located in the City of El Cajon. The level of noise acceptable to new development in the vicinity of proposed new airports, active military airports being converted to civilian use, and existing civilian airports is established as an annual CNEL of 60 dBA. Noise-sensitive land uses should generally not be located within the 60 dBA annual CNEL noise contour of a public airport, or within 2 miles of a private airstrip.

Small Turbine(s)/MET Facilities

The proposed project does not include the development of noise-sensitive land uses and would not expose people to excessive noise levels due to the proximity of a public or private airport. Therefore, there would be **no impact**.

Large Turbine(s)

The proposed project does not include the development of noise-sensitive land uses and would not expose people to excessive noise levels due to the proximity of a public or private airport. Therefore, there would be **no impact**.

2.8.4 Cumulative Impact Analysis

The geographic scope of cumulative impact analysis for noise is limited to areas surrounding noise-generating sources, such as roadways, agricultural, or industrial uses, because noise impacts are localized in nature. Geographic scope can be the entire area within which the resource has the potential to occur. For the purpose of this EIR, the geographic scope for the cumulative analysis of noise impacts includes the San Diego region, which encompasses the entire County, including both incorporated and unincorporated areas, as well as surrounding counties, and tribal and public agency lands.

2.8.4.1 Noise Exposure

A cumulative noise impact would occur if construction and operation associated with cumulative regional land use projects, such as those identified in adjacent city and county general plans and regional transportation plans, combined would exceed the noise compatibility guidelines and standards of the Noise Element. For example, the 2030 San Diego Regional Transportation Plan Projects, such as the expansion of a portion of I-8, would increase traffic noise above the Noise Element standards. However, development and construction proposed under most cumulative projects would be subject to regulations that require compliance with noise standards, such as those contained in the State of California Code of Regulations and by the OSM. The exception to this would be projects proposed in the country of Mexico along the U.S.–Mexico international border and on tribal lands. Therefore, even though required regulations would minimize the cumulative impact of projects in the United States, development in Mexico along the U.S.–Mexico international border or on tribal lands within the vicinity of existing noise-sensitive land uses would not be required to comply with the same noise standards, and a potentially cumulatively considerable impact would occur.

Small Turbine(s)/MET Facilities

As described in Section 2.8.3.1, construction and operational noise for small wind turbines or MET facilities would be below the thresholds established in the County's Noise Compatibility Guidelines and Noise Ordinance. Therefore, the development of small wind turbines and MET facilities under the proposed project **would not contribute to a cumulatively considerable impact**.

Large Turbine(s)

As described in Section 2.8.3.1, all future large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element Noise Standards, Noise Ordinance and Wind Energy Ordinance prior to approval. However, as it is possible for a noise waiver to be granted subject to specific conditions, the development of large wind turbines under the proposed project **would potentially contribute to a cumulatively considerable impact (NOI-4)**.

2.8.4.2 Excessive Groundborne Vibration

A cumulative groundborne vibration impact would occur if one or more cumulative projects would exceed the FTA and Federal Railroad Administration guidelines for groundborne vibration and noise. However, there are no specific plans or time scales for individual construction projects. Therefore, it is not possible to determine exact vibration levels, locations, or time periods for construction. Potential vibration impacts from construction would need to be analyzed on a case-by-case basis. Therefore, cumulative projects have the potential to result in a cumulatively considerable impact if located in close proximity to one another and if construction of multiple cumulative projects were to occur at the same time. Therefore, a potentially cumulatively considerable impact may occur.

Small Turbine(s)/MET Facilities

As described in Section 2.8.3.2, future small wind turbines and MET facilities are not expected to require blasting or major grading activities and, therefore, are not expected to require the operation of heavy earth-moving equipment that would result in vibration impacts. Additionally, all future projects would be required to comply with Sections 36.409 and 36.410 of the County's Noise Ordinance. Therefore, the development of small wind turbines and MET facilities under the proposed project **would not contribute to a cumulatively considerable impact**.

Large Turbine(s)

As described in Section 2.8.3.2, all future large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element Noise Standards, Noise Ordinance, and Wind Energy Ordinance prior to approval. Therefore, the development of large wind turbines under the proposed project **would not contribute to a cumulatively considerable impact**.

2.8.4.3 Permanent Increase in Ambient Noise Levels

A cumulative noise impact would occur if construction and development associated with cumulative regional land use projects, such as those identified in adjacent city and county general plans and regional transportation plans, when combined would result in an increase in ambient noise that would exceed the County's noise standards. For example, the extension of State Route (SR) 905 from I-805 to the U.S.–Mexico international border and widening of SR-94 from SR-125 to Jamacha Road would result in a permanent increase in ambient noise due to an increase in roadway noise. However, development and construction proposed under most cumulative projects would be subject to regulations that require compliance with noise standards. The exception to this would be projects proposed in Mexico along the U.S.–Mexico international border and on tribal lands. Therefore, even though required regulations would minimize the cumulative impact of projects in the United States, development of land uses in Mexico along the U.S.–Mexico international border or on tribal lands that permanently increase noise would not be required to comply with the same noise standards, and a potentially cumulatively considerable impact could occur.

Small Turbine(s)/MET Facilities

As described in Section 2.8.3.3, the implementation of the minimum setbacks and the requirement for noise data under the Zoning Ordinance amendment would ensure that interior and exterior noise levels from the development of small wind turbine and MET facilities comply with the Noise Ordinance. Therefore, the development of small wind turbines and MET facilities under the proposed project **would not contribute to a cumulatively considerable impact**.

Large Turbine(s)

As described in Section 2.8.3.3, all future large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element Noise Standards, Noise Ordinance, and Wind Energy Ordinance prior to approval. However, as it is possible for a noise waiver to be granted subject to specific conditions, the development of large wind turbines under the proposed project **would potentially contribute to a cumulatively considerable impact (NOI-5)**.

2.8.4.4 Temporary or Periodic Increase in Ambient Noise Levels

A cumulative noise impact would occur if construction associated with one or more projects in close proximity to one another would result in combined noise levels that would temporarily increase ambient noise levels beyond the standards in the County Noise Ordinance. However, since there are no specific plans or time scales for individual projects, it is not possible to determine exact noise levels, locations, or time periods for construction. Additionally, projects

would have to be constructed in close proximity to each other to result in a cumulative impact. Construction projects in incorporated jurisdictions would be subject to noise standards and limits for the jurisdiction in which they are proposed. Projects proposed in Mexico along the U.S.–Mexico international border and on tribal lands would not be subject to County of San Diego noise regulations and standards; however, potential construction noise-related impacts in these areas would be temporary and limited to the area immediately surrounding the project. Similarly, a cumulative nuisance noise impact would occur if noise associated with one or more land uses in an area would result in combined noise levels that would temporarily increase ambient noise levels beyond the standards in the County Noise Ordinance. However, these events would be short-term and event-specific in nature. Therefore, a potentially cumulatively considerable impact associated with temporary increases in ambient noise levels would not occur.

Small Turbine(s)/MET Facilities

As described in Section 2.8.3.4, due to the brief construction time period associated with the installation of residential-scale wind turbines and MET facilities, and because traffic generated by the construction of these facilities would be relatively minor, temporary and periodic noise impacts would be less than significant. Therefore, the development of small wind turbines and MET facilities under the proposed project **would not contribute to a cumulatively considerable impact**.

Large Turbine(s)

As described in Section 2.8.3.4, all future large wind turbines would be required to comply with the County's Noise Compatibility Guidelines, General Plan Noise Element Noise Standards, Noise Ordinance, and Wind Energy Ordinance prior to approval. However, as it is possible for a noise waiver to be granted subject to specific conditions, the development of large wind turbines under the proposed project **would potentially contribute to a cumulatively considerable impact (NOI-6)**.

2.8.4.5 Excessive Noise Exposure from a Public or Private Airport

A cumulative noise impact would occur if construction and operation associated with cumulative regional land use projects, such as those identified in adjacent city and county general plans and regional transportation plans, when combined would result in the exposure of noise-sensitive land uses to excessive noise from a public or private airport. Development and construction proposed under most cumulative projects would be subject to regulations that require compliance with noise standards, such as the 1990 California Airport Noise Standards and applicable ALUCPs. The exception to this would be projects proposed in Mexico along the U.S.–Mexico international border and on tribal lands. It is possible that a new private airstrip would be

proposed as part of a cumulative project on tribal land or in Mexico along the U.S.–Mexico international border that would result in the exposure of noise-sensitive land uses to excessive noise. For example, a health clinic is proposed for the Ewiiaapaayp Reservation, as listed in Table 1-4f, Proposed Projects on Tribal Lands, and health clinics sometimes include helipads to transport patients. Therefore, even though required regulations would minimize the cumulative impact of projects in the United States, development in Mexico along the U.S.–Mexico international border or on tribal lands within the vicinity of existing noise-sensitive land uses would not be required to comply with the same noise standards and a potentially cumulatively considerable impact could occur.

Small Turbine(s)/MET Facilities

As described in Section 2.8.3.5, the proposed project does not include the development of noise-sensitive land uses and would not expose people to excessive noise levels due to the proximity of a public or private airport. Therefore, the development of small wind turbines and MET facilities under the proposed project **would not contribute to a cumulatively considerable impact**.

Large Turbine(s)

As described in Section 2.8.3.5, the proposed project does not include the development of noise-sensitive land uses and would not expose people to excessive noise levels due to the proximity of a public or private airport. Therefore, the development of large wind turbines under the proposed project **would not contribute to a cumulatively considerable impact**.

2.8.5 Significance of Impacts Prior to Mitigation

The proposed project would result in potentially significant impacts related to noise levels, ambient noise levels and temporary or periodic increases in ambient noise levels as a result of large wind turbines. The proposed project would not result in potentially significant impacts associated with excessive groundborne vibration or excessive noise exposure from airports. Small wind turbines and MET facilities would not result in any significant noise impacts.

2.8.6 Mitigation Measures

2.8.6.1 Noise Exposure

The proposed project would amend current regulations related to large wind turbines projects that may directly or indirectly affect noise exposure. Appropriate feasible and enforceable mitigation measures could not be identified that would reduce potential impacts. A discussion of infeasible mitigation measures is provided as follows.

Infeasible Mitigation

The following measure was considered in attempting to reduce direct and cumulative impacts associated with noise exposure within the County to below a level of significance. However, it has been determined that this measure is infeasible for reasons described as follows. Therefore, this measure would not be implemented.

- Require that all future large wind turbine projects meet the requirements of Section 6952(f).1 in the amended Zoning Ordinance without exception (i.e., remove Section 6952(f).2 that allows for a waiver in some circumstances). This measure would be infeasible because some future large wind turbine projects may not be able to meet the new Zoning Ordinance provisions and still provide a viable wind energy project. As such, this measure would conflict with the project objectives to facilitate the use of renewable wind energy within the County, to maximize the production of energy from renewable wind sources, and to reduce the potential for energy shortages and outages by facilitating local energy supply.

As it cannot be concluded at this stage that impacts related to excessive noise levels from large wind turbines allowed with a Major Use Permit under the proposed Zoning Ordinance amendment would be avoided or mitigated, impacts would remain significant and unavoidable. Chapter 4, Project Alternatives, provides a discussion of alternatives to the proposed project that would result in some reduced impacts associated with noise exposure as compared to the proposed project.

2.8.6.2 Excessive Groundborne Vibration

The project will not result in any significant impacts due to excessive groundborne vibration and no mitigation measures are required.

2.8.6.3 Permanent Increase in Ambient Noise Levels

The proposed project would amend current regulations related to large wind turbines projects that may directly or indirectly affect noise exposure. Appropriate feasible and enforceable mitigation measures could not be identified that would reduce potential impacts. A discussion of infeasible mitigation measures is provided as follows.

Infeasible Mitigation

The following measure was considered in attempting to reduce direct and cumulative impacts associated with permanent increases in ambient noise levels within the County to below a level

of significance. However, it has been determined that this measure is infeasible for reasons described as follows. Therefore, this measure would not be implemented.

- Require that all future large wind turbine projects meet the requirements of Section 6952(f).1 in the amended Zoning Ordinance without exception (i.e., remove Section 6952(f).2 that allows for a waiver in some circumstances). This measure would be infeasible because some future large wind turbine projects may not be able to meet the new Zoning Ordinance provisions and still provide a viable wind energy project. As such, this measure would conflict with the project objectives to facilitate the use of renewable wind energy within the County, to maximize the production of energy from renewable wind sources, and to reduce the potential for energy shortages and outages by facilitating local energy supply.

As it cannot be concluded at this stage that impacts related to permanent increases in ambient noise levels from large wind turbines allowed with a Major Use Permit under the proposed Zoning Ordinance amendment would be avoided or mitigated, impacts would remain significant and unavoidable. Chapter 4, Project Alternatives, provides a discussion of alternatives to the proposed project that would result in some reduced impacts associated with permanent increases in ambient noise levels as compared to the proposed project.

2.8.6.4 Temporary or Periodic Increase to Ambient Noise

The proposed project would amend current regulations related to large wind turbines projects that may directly or indirectly affect noise exposure. Appropriate feasible and enforceable mitigation measures could not be identified that would reduce potential impacts. A discussion of infeasible mitigation measures is provided as follows.

Infeasible Mitigation

The following measure was considered in attempting to reduce direct and cumulative impacts associated with temporary or periodic increases in ambient noise levels within the County to below a level of significance. However, it has been determined that this measure is infeasible for reasons described as follows. Therefore, this measure would not be implemented.

- Require that all future large wind turbine projects meet the requirements of Section 6952(f).1 in the amended Zoning Ordinance without exception (i.e., remove Section 6952(f).2 that allows for a waiver in some circumstances). This measure would be infeasible because some future large wind turbine projects may not be able to meet the new Zoning Ordinance provisions and still provide a viable wind energy project. As such, this measure would conflict with the project objectives to facilitate the use of renewable wind energy within the County, to maximize the production of energy from renewable wind

sources, and to reduce the potential for energy shortages and outages by facilitating local energy supply.

As it cannot be concluded at this stage that impacts related to temporary or periodic increases in ambient noise levels from large wind turbines allowed with a Major Use Permit under the proposed Zoning Ordinance amendment would be avoided or mitigated, impacts would remain significant and unavoidable. Chapter 4, Project Alternatives, provides a discussion of alternatives to the proposed project that would result in some reduced impacts associated with temporary or periodic increases in ambient noise levels as compared to the proposed project.

2.8.6.5 Excessive Noise Exposure from a Public or Private Airport

The project will not result in any significant impacts to due to excessive noise exposure from a public or private airport and no mitigation measures are required.

2.8.7 Conclusion

Noise Exposure

Development of small wind turbines and temporary MET facilities pursuant to the proposed Zoning Ordinance amendments would not result in a significant adverse effect due to exposing people to or generating noise levels in excess of standards established in the County's General Plan, County's Noise Ordinance, County's Noise Compatibility Guidelines, or County's Zoning Ordinance. Large wind turbines developed under the proposed project would result in significant impacts relative to noise exposure. Feasible and enforceable mitigation measures that would reduce direct and cumulative impacts could not be identified. Therefore, impacts would remain significant and unavoidable.

Groundborne Vibration and Noise Impacts

The proposed project would not result in a significant adverse effect due to exposing people to or generating excessive groundborne vibration or groundborne noise levels.

Permanent Increase to Ambient Noise

Development of small wind turbines and temporary MET facilities pursuant to the proposed Zoning Ordinance amendments would not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the proposed project. Large wind turbines developed under the proposed project would result in significant impacts relative to a permanent increase in ambient noise. Feasible and enforceable mitigation measures that

would reduce direct and cumulative impacts could not be identified. Therefore, impacts would remain significant and unavoidable.

Temporary or Periodic Increase to Ambient Noise

Development of small wind turbines and temporary MET facilities pursuant to the proposed Zoning Ordinance amendments would not result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the proposed project. Large wind turbines developed under the proposed project would result in significant impacts relative to a temporary or periodic increase in ambient noise. Feasible and enforceable mitigation measures that would reduce direct and cumulative impacts could not be identified. Therefore, impacts would remain significant and unavoidable.

Excessive Noise Exposure from a Public or Private Airport

The proposed project would not result in significant adverse effect to an airport land use plan, within 2 miles of a public airport or public use airport, or within the vicinity of a private airstrip that would expose people residing or working in the project area to excessive noise levels.

Table 2.8-1
Hearing Thresholds in the Infrasonic and Low Frequency Range

Frequency (Hz)	4	8	10	16	20	25	40	50	80	100	125	160	200
Sound pressure level (dB)	107	100	97	88	79	69	51	44	32	27	22	18	14

Note: Average hearing thresholds (for young healthy people) in the infrasound (4 to 20 Hz) and low frequency region (10 to 200 Hz).

Table 2.8-2
Typical A-Weighted Sound Levels Measured in the Environment and Industry

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet flyover at 1,000 feet		
	— 100 —	
Gas lawnmower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	— 70 —	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher in next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: Caltrans 2009, p. 2-21

Table 2.8-3
Guideline for Determining the Significance of Groundborne Vibration and Noise Impacts for Special Buildings

Type of Building or Room	Groundborne Vibration Impact Levels (inches/second RMS)		Groundborne Vibration Impact Levels (dB re 20 micro Pascals)	
	Frequent Events[1]	*Occasional or Infrequent Events*[2]	*Frequent Events*[1]	*Occasional or Infrequent Events*[2]
Concert Halls, TV Studios, and Recording Studios	0.0018	0.0018	25 dBA	25 dBA
Auditoriums	0.0040	0.010	30 dBA	38 dBA
Theatres	0.0040	0.014	35 dBA	43 dBA

Source: FTA 2006
Notes: [1]"Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
[2]"Occasional or Infrequent Events" are defined as fewer than 70 vibrations events per day. This combined category includes most commuter rail systems.
[3]If the building will be rarely occupied when the trains are operating there is no need to consider impact.
[4]For historic buildings and ruins, the allowable upper limit for continuous vibration to structures is identified to be 0.056 inches/second RMS. Transient conditions (single events) would be limited to approximately twice in the continuous acceptable value.

Table 2.8-4
San Diego County Noise Ordinance Sound Level Limits

Zone	Applicable Limit 1-Hour Average Sound Level (dB)		
	7 a.m. to 7 p.m.	*7 p.m. to 10 p.m.*	*10 p.m. to 7 a.m.*
(1) RS, RD, RR, RHM, A70, A72, S80, S81, S87, S90, S92, RV, and RU with a density of less than 11 dwelling units per acre	50	50	45
(2) RRO, RC, RM, C30, S86, V5 and RV and RU with a density of 11 or more dwelling units per acre	55	55	50
(3) S94, V4, all other commercial zones.	60	60	55
(4) V1, V2	60	55	see below
V1	60	55	55
V2	60	55	50
V3	70	70	65
(5) M50, M52, M54	70	70	70
(6) S82, M56 and M58	75	75	75
(7) S88 (see note 4 below)			

Source: County Of San Diego 2011b
Notes: [1]If the measured ambient level exceeds the applicable limit noted in the table, the allowable 1-hour average sound level will be the ambient noise level. The ambient noise level will be measured when the alleged noise violation source is not operating.
[2]The sound-level limit at a location on a boundary between two zoning districts is the arithmetic mean of the respective limits for the two districts; provided, however, that the 1-hour average sound-level limit applicable to extractive industries, including but not limited to borrow pits and mines, will be 75 dB at the property line, regardless of the zone where the extractive industry is actually located.
[3]Fixed-location, public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise-level limits of this section, measured at or beyond 6 feet from the boundary of the easement upon which the equipment is located.
[4]S88 zones are Specific Planning Areas, which allow different uses. The sound level limits present in Table 2.8-4 that apply in an S88 zone depend on the use being made of the property. The limits in Table 2.8-4, subsection (1) apply to a property with a residential, agricultural, or civic use. The limits in subsection (3) apply to a property with a commercial use. The limits in subsection (5) apply to a property with an industrial use that would only be allowed in an M50, M52, or M54 zone. The limits in subsection (6) apply to all property with an extractive use or a use that would only be allowed in an M56 or M58 zone.

Table 2.8-5
San Diego County Code Section 36.404 Sound Level Limits in Decibels (dBA)

Zone	Time	One-Hour Average Sound Level Limits (dBA)
(1) R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-90, S-92 and R-V and R-U with a density of less than 11 dwelling units per acre	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45
(2) R-RO, R-C, R-M, S-86, V5 and R-V and R-U with a density of 11 or more dwelling units per acre	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50
(3) S-94, V-4 and all other commercial zones	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55
(4) V1, V2 V1, V2 V1 V2	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m. 10 p.m. to 7 a.m.	60 55 55 50
V3	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.	70 65
(5) M-50, M-52 and M-54	Anytime	70
(6) S-82, M-56 and M-58	Anytime	75

Note: If the measured ambient level exceeds the applicable limit noted above, the allowable one-hour average sound level shall be the ambient noise level, plus three decibels. The ambient noise level shall be measured when the alleged noise violation source is not operating.
Source: County of San Diego 2009b, Table 36.404

Table 2.8-6
Octave Band Sound Level Limits in Decibels

Octave band (Hz)	31.5	63.0	125	250	500	1,000	2,000	4,000	8,000
Residential (1)	60.0	49.0	46.0	42.0	38.0	34.0	29.0	24.0	22.0
Commercial (2)	75.0	64.0	61.0	57.0	53.0	49.0	44.0	39.0	35.0
Industrial and other (3)	80.0	69.0	66.0	62.0	58.0	54.0	49.0	44.0	40.0

Source: County of San Diego 2009b, Table 36.437

Table 2.8-7
Guideline for Determining the Significance of Groundborne Vibration and Noise Impacts

Land Use Category	Groundborne Vibration Impact Levels (inches/second RMS)		Groundborne Vibration Impact Levels (dB re 20 microPascals)	
	Frequent Events[1]	*Occasional or Infrequent Events*[2]	*Frequent Events*[1]	*Occasional or Infrequent Events*[2]
Category 1: Buildings where low ambient vibration is essential for interior operations (research and manufacturing facilities with special vibration constraints)	0.0018[3]	0.0018[3]	N/A	N/A
Category 2: Residences and buildings where people normally sleep (hotels, hospitals, residences, and other sleeping facilities)	0.0040	0.010	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use (schools, churches, libraries, other institutions, and quiet uses)	0.0056	0.014	40 dBA	48 dBA

Source: FTA 2006

Notes: [1]"Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

[2]"Occasional or Infrequent Events" are defined as fewer than 70 vibrations events per day. This combined category includes most commuter rail systems.

[3]This criterion limit is based on a level that is acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design on the heating, ventilating, and air conditioning (HVAC) systems and stiffened floors.

[4]Vibration-sensitive equipment is not sensitive to groundborne noise.

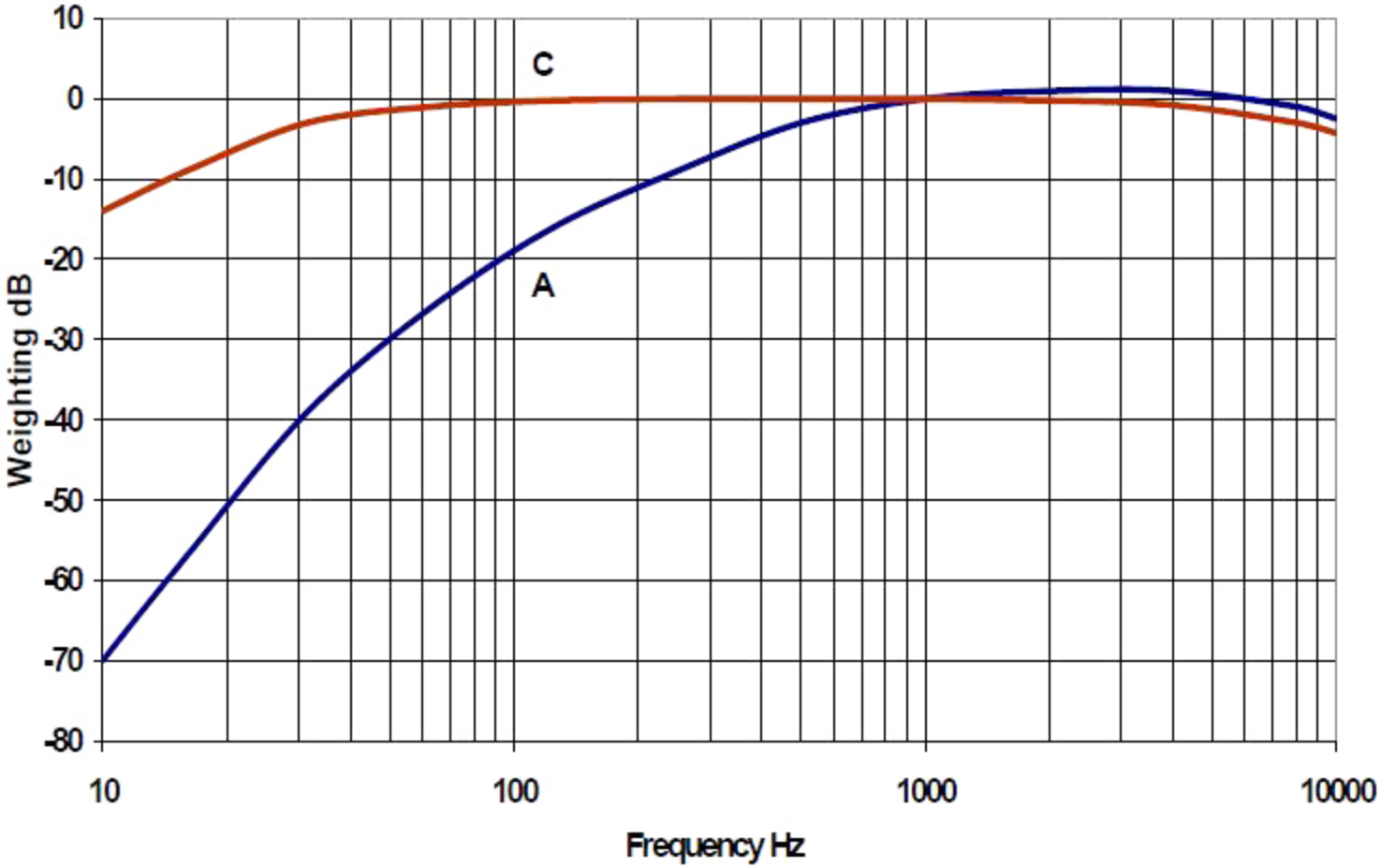
[5]There are some buildings, such as concert halls, television and recording studios, and theatres that can be very sensitive to vibration and noise but do not fit into any of the three categories. The following table gives criteria for acceptable levels of groundborne vibration and noise for these various types of special uses.

[6]For Categories 2 and 3 with occupied facilities, isolated events such as blasting are significant when the peak particle velocity (PPV) exceeds one inch per second. Non-transportation vibration sources such as impact pile drivers or hydraulic breakers are significant when their PPV exceeds 0.1 inch per second. More specific criteria for structures and potential annoyance were developed by Caltrans (2004) and will be used to evaluate these continuous or transient sources in San Diego County.

Table 2.8-8
Typical Construction Equipment Noise Levels

Equipment	Typical Noise Level (dBA) at 50 feet from source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Crane, Derrick	88
Dozer	85
Grader	85
Jack Hammer	88
Loader	85
Paver	89
Pile-drive (Impact)	101
Pump	76
Roller	74
Scraper	89
Truck	88

Source: County Of San Diego 2011b, p. 2.11-59



SOURCE: AWEA 2009

FIGURE 2.8-1
Weighting Networks

DUDEK

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